ASME B30.7-2001
(Revision of ASME B30.7-1994)

BASE-MOUNTED DRUM HOISTS

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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SAFETY STANDARD FOR CABLEWAYS, CRANES, DERRICKS, HOISTS, HOOKS, JACKS, AND SLINGS

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FOREWORD

This American National Standard, Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings, has been developed under the procedures accredited by the American National Standards Institute (formerly the United States of America Standards Institute). This Standard had its beginning in December 1916 when an eight-page Code of Safety Standards for Cranes, prepared by an ASME Committee on the Protection of Industrial Workers, was presented to the annual meeting of the ASME.

Meetings and discussions regarding safety on cranes, derricks, and hoists were held from 1920 to 1925, involving the ASME Safety Code Correlating Committee, the Association of Iron and Steel Electrical Engineers, the American Museum of Safety, the American Engineering Standards Committee (later changed to American Standards Association and subsequently to the USA Standards Institute), Department of Labor—State of New Jersey, Department of Labor and Industry—State of Pennsylvania, and the Locomotive Crane Manufacturers Association. On June 11, 1925, the American Engineering Standards Committee approved the ASME Safety Code Correlating Committee's recommendation and authorized the project with the U.S. Department of the Navy, Bureau of Yards and Docks, and ASME as sponsors.

In March 1926, invitations were issued to 50 organizations to appoint representatives to a Sectional Committee. The call for organization of this Sectional Committee was sent out October 2, 1926, and the committee organized November 4, 1926, with 57 members representing 29 national organizations. The Safety Code for Cranes, Derricks, and Hoists, ASA B30.2-1943, was created from the eight-page document referred to in the first paragraph. This document was reaffirmed in 1952 and widely accepted as a safety standard.

Due to changes in design, advancement in techniques, and general interest of labor and industry in safety, the Sectional Committee, under the joint sponsorship of ASME and the Naval Facilities Engineering Command, U.S. Department of the Navy, was reorganized as an American National Standards Committee on January 31, 1962, with 39 members representing 27 national organizations.

The format of the previous code was changed so that separate volumes (each complete as to construction and installation; inspection, testing, and maintenance; and operation) would cover the different types of equipment included in the scope of B30.

In 1982, the Committee was reorganized as an Accredited Organization Committee, operating under procedures developed by ASME and accredited by the American National Standards Institute.

This Standard presents a coordinated set of rules that may serve as a guide to government and other regulatory bodies and municipal authorities responsible for the guarding and inspection of the equipment falling within its scope. The suggestions leading to accident prevention are given both as mandatory and advisory provisions; compliance with both types may be required by employers of their employees.

In case of practical difficulties, new developments, or unnecessary hardship, the administrative or regulatory authority may grant variances from the literal requirements or permit the use of other devices or methods, but only when it is clearly evident that an equivalent degree of protection is thereby secured. To secure uniform application and interpretation of this Standard, administrative or regulatory authorities are urged to consult the B30 Committee, in accordance with the format described in Section III, before rendering decisions on disputed points.

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This volume of the Standard, which was approved by the B30 Committee and by ASME, was approved by ANSI and designated as an American National Standard on February 22, 2001.

Safety codes and standards are intended to enhance public safety. Revisions result from committee consideration of factors such as technological advances, new data, and changing environmental and industry needs. Revisions do not imply that previous editions were inadequate.

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Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings

(The following is a roster of the Committee at the time of approval of this Standard)

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ASME B30.7-2001
SUMMARY OF CHANGES

The 2001 Edition of ASME B30.7 includes editorial changes, revisions, and corrections introduced in B30.7a-1995, B30.7b-1996, and B30.7c-1997, as well as the following changes, identified by **(01)**:

Page	*Location*	*Change*
1, 2	General	(1) Listing of B30 volumes updated (2) Ninth paragraph revised
	Footnote 1	Revised
	Section III	ASME address updated
5–7	Section 7-0.2	(1) Definition of *qualified person* revised (2) Reference to Figs. 1 through 3 added
	Section 7-0.3	(1) First paragraph editorially revised (2) ASME address updated (3) Footnote 1 added
13	Para. 7-2.2.2	Revised

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SAFETY STANDARD FOR CABLEWAYS, CRANES, DERRICKS, HOISTS, HOOKS, JACKS, AND SLINGS

INTRODUCTION

(01) General

This Standard is one of a series of safety standards on various subjects which have been formulated under the general auspices of the American National Standards Institute. One purpose of the Standard is to serve as a guide to governmental authorities having jurisdiction over subjects within the scope of the Standard. It is expected, however, that the Standard will find a major application in industry, serving as a guide to manufacturers, purchasers, and users of the equipment.

For the convenience of the user, the Standard has been divided into separate volumes:

B30.1 Jacks
B30.2 Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
B30.3 Construction Tower Cranes
B30.4 Portal, Tower, and Pedestal Cranes
B30.5 Mobile and Locomotive Cranes
B30.6 Derricks
B30.7 Base-Mounted Drum Hoists
B30.8 Floating Cranes and Floating Derricks
B30.9 Slings
B30.10 Hooks
B30.11 Monorails and Underhung Cranes
B30.12 Handling Loads Suspended From Rotorcraft
B30.13 Storage/Retrieval (S/R) Machines and Associated Equipment
B30.14 Side Boom Tractors
B30.15 Mobile Hydraulic Cranes
Note: B30.15-1973 has been withdrawn. The revision of B30.15 is included in the latest edition of B30.5.
B30.16 Overhead Hoists (Underhung)
B30.17 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)
B30.18 Stacker Cranes (Top or Under Running Bridge, Multiple Girder With Top or Under Running Trolley Hoist)
B30.19 Cableways
B30.20 Below-the-Hook Lifting Devices
B30.21 Manually Lever Operated Hoists
B30.22 Articulating Boom Cranes
B30.23 Personnel Lifting Systems
B30.24 Container Cranes[1]
B30.25 Scrap and Material Handlers
B30.26 Rigging Hardware[1]
B30.27 Material Placement Systems[1]
B30.28 Balance-Lifting-Units[1]

If adopted for governmental use, the references to other national codes and standards in the specific volumes may be changed to refer to the corresponding regulations of the governmental authorities.

The use of cableways, cranes, derricks, hoists, hooks, jacks, and slings is subject to certain hazards that cannot be met by mechanical means but only by the exercise of intelligence, care, and common sense. It is therefore essential to have personnel involved in the use and operation of equipment who are competent, careful, physically and mentally qualified, and trained in the safe operation of the equipment and the handling of the loads. Serious hazards are overloading, dropping or slipping of the load caused by improper hitching or slinging, obstructing the free passage of the load, and using equipment for a purpose for which it was not intended or designed.

The Standards Committee fully realizes the importance of proper design factors, minimum or maximum sizes, and other limiting dimensions of wire rope or chain and their fastenings, sheaves, sprockets, drums, and similar equipment covered by the Standard, all of which are closely connected with safety. Sizes, strengths, and similar criteria are dependent on many different factors, often varying with the installation and uses. These factors depend on the condition of the equipment or material; on the loads; on the acceleration or speed of the ropes, chains, sheaves, sprockets, or drums; on the type of attachments; on the number, size, and arrangement of sheaves or other

[1] B30.24, B30.26, B30.27, and B30.28 are in the development stage. (01)

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parts; on environmental conditions causing corrosion or wear; and on many variables that must be considered in each individual case. The rules given in the Standard must be interpreted accordingly, and judgment used in determining their application.

Some of the provisions of this Standard require compliance with information found in manuals or other documents supplied by the manufacturer with the equipment. The information includes recommendations, requirements, and instructions (e.g., ''the reeving shall be checked for compliance with the recommendations of the manufacturer'').

Compliance with the provisions should not preclude the possibility of consulting a qualified person. This is true particularly when: the equipment has been altered, repaired, or modified; the manuals or documents supplied by the manufacturer are no longer available; or the manufacturer or a successor is no longer in business and the manuals are no longer available. However, the purpose of consulting a qualified person shall not be to avoid contacting the manufacturer and using the information supplied by the manufacturer.

The Standards Committee will be glad to receive criticisms of this Standard's requirements and suggestions for its improvement, especially those based on actual experience in application of the rules.

(01) Suggestions for changes to the Standard should be submitted to the Secretary of the B30 Committee, ASME, Three Park Avenue, New York, NY 10016-5990, and should be in accordance with the following format:

(a) cite the specific paragraph designation of the pertinent volume;

(b) indicate the suggested change (addition, deletion, revision, etc.);

(c) briefly state the reason and/or evidence for the suggested change;

(d) submit suggested changes to more than one paragraph in the order that the paragraphs appear in the volume.

The B30 Committee will consider each suggested change in a timely manner in accordance with its procedures.

Section I: Scope

This Standard applies to the construction, installation, operation, inspection, and maintenance of jacks; power-operated cranes, monorails, and crane runways; power-operated and manually operated derricks and hoists; lifting devices, hooks, and slings; and cableways.

This Standard does not apply to track and automotive jacks, railway or automobile wrecking cranes, shipboard cranes, shipboard cargo-handling equipment, well-drilling derricks, skip hoists, mine hoists, truck body hoists, car or barge pullers, conveyors, excavating equipment, or equipment coming within the scope of the following Committees: A10, A17, A90, A92, A120, B20, B56, and B77.

Section II: Purpose

This Standard is designed to:

(a) guard against and minimize injury to workers, and otherwise provide for the protection of life, limb, and property by prescribing safety requirements;

(b) provide direction to owners, employers, supervisors, and others concerned with, or responsible for, its application; and

(c) guide governments and other regulatory bodies in the development, promulgation, and enforcement of appropriate safety directives.

Section III: Interpretations (01)

Upon request, the B30 Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B30 Committee, ASME, Three Park Avenue, New York, NY 10016-5990.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his request utilizing the following format.

Subject: Cite the applicable paragraph number(s) and provide a concise description.

Edition: Cite the applicable edition of the pertinent volume for which the interpretation is being requested.

Question: Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for approval of a proprietary design or situation. The inquirer may also include any plans or drawings which are necessary to explain the question; however, they should not contain any proprietary names or information.

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Requests that are not in this format will be rewritten in this format by the Committee prior to being answered, which could change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information which might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Section IV: New and Existing Installations

(a) Effective Date. The effective date of this volume for the purpose of defining new and existing installations shall be 1 year after its date of issuance.

(c) New Installations. Construction, installation, inspection, testing, maintenance, and operation of equipment manufactured and facilities constructed after the effective date of this volume shall conform with the mandatory requirements of this volume.

(c) Existing Installations. Inspection, testing, maintenance, and operation of equipment manufactured and facilities constructed prior to the effective date of this volume shall be done, as applicable, in accordance with the requirements of this volume.

It is not the intent of this volume to require retrofitting of existing equipment. However, when an item is being modified, its performance requirement shall be reviewed relative to the current volume. If the performance differs substantially, the need to meet the current requirement shall be evaluated by a qualified person selected by the owner (user). Recommended changes shall be made by the owner (user) within 1 year.

Section V: Mandatory and Advisory Rules

Mandatory rules of this volume are characterized by use of the word *shall*. If a provision is of an advisory nature, it is indicated by use of the word *should* and is a recommendation to be considered, the advisability of which depends on the facts in each situation.

Section VI: Metric Conversions

The values stated in U.S. customary units are to be regarded as the standard.

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BASE-MOUNTED DRUM HOISTS

CHAPTER 7-0
Scope, Definitions, and References

Section 7-0.1: Scope of B30.7

Within the general scope defined in Section I, B30.7 applies to base-mounted drum hoists arranged for mounting on a foundation or other supporting structure for lifting or lowering loads, to derrick swingers, and to any variations which retain the same fundamental characteristics. The scope includes hoists which are powered by internal combustion engines, electric motors, compressed air, or hydraulics, and which utilize drums and rope. This volume does not apply to overhead hoists, car pullers, barge pullers, truck body hoists, or other hoists or winches used exclusively in horizontal pulling applications.

Provisions of this volume do not encompass all of the safety precautions and safeguards applicable when hoist loads consist wholly, or in part, of personnel. For personnel handling hoists refer to ANSI A10.4. When base-mounted drum hoists are used as an integral part of other lifting equipment, this Standard may not apply.

Section 7-0.2: Definitions

administrative or regulatory authority: governmental agency, or the employer in the absence of governmental jurisdiction.

appointed: assigned specific responsibilities by the employer or the employer's representative.

authorized: appointed by a duly constituted administrative or regulatory authority.

base: the mounting flanges or feet for attachment of a hoist to its supporting structure or foundation.

boom: a member hinged to a fixed or rotating structure or to a derrick mast, with its outer end supported by ropes leading to a gantry or A-frame, or derrick mast top or other anchorage, and used for supporting the hoisting tackle.

brake: a device used for retarding or stopping motion by friction or power means.

clutch: a means for engagement or disengagement of power.

crossover points: in multiple layer spooling of rope on a drum, those points of rope contact where the rope crosses the preceding rope layer.

derrick: an apparatus for lifting or lowering loads consisting of a mast or equivalent member held at the head by guys or braces, with or without a boom, for use with hoists and ropes.

designated person: a person selected or assigned by the employer or the employer's representative as being competent to perform specific duties.

drum: the cylindrical member around which rope is wound for lifting or lowering the load or boom, or swinging the boom supporting structure.

drum capacity, rope: the length of a specific diameter of rope which can be wound on a drum.

dynamic loading: loads introduced into the machine or its components by forces in motion.

exposed: applies to hazardous objects not guarded or isolated (capable of being contacted inadvertently).

eye splice: an eye formed at the end of a rope by splicing the dead end into the live end at the base of the eye.

flange point: a point of contact between rope and drum flange where the rope changes layers.

gantry: (also known as A-frame) a structural frame, extending above a base structure, to which boom support ropes are reeved.

hoist: a power driven drum or drums capable of lifting and lowering loads.

hoist, direct geared: a hoist with one drum(s) geared directly to its power source.

hoist, drum: a hoist with hoisting drum(s), and with or without a swinger (see Fig. 1).

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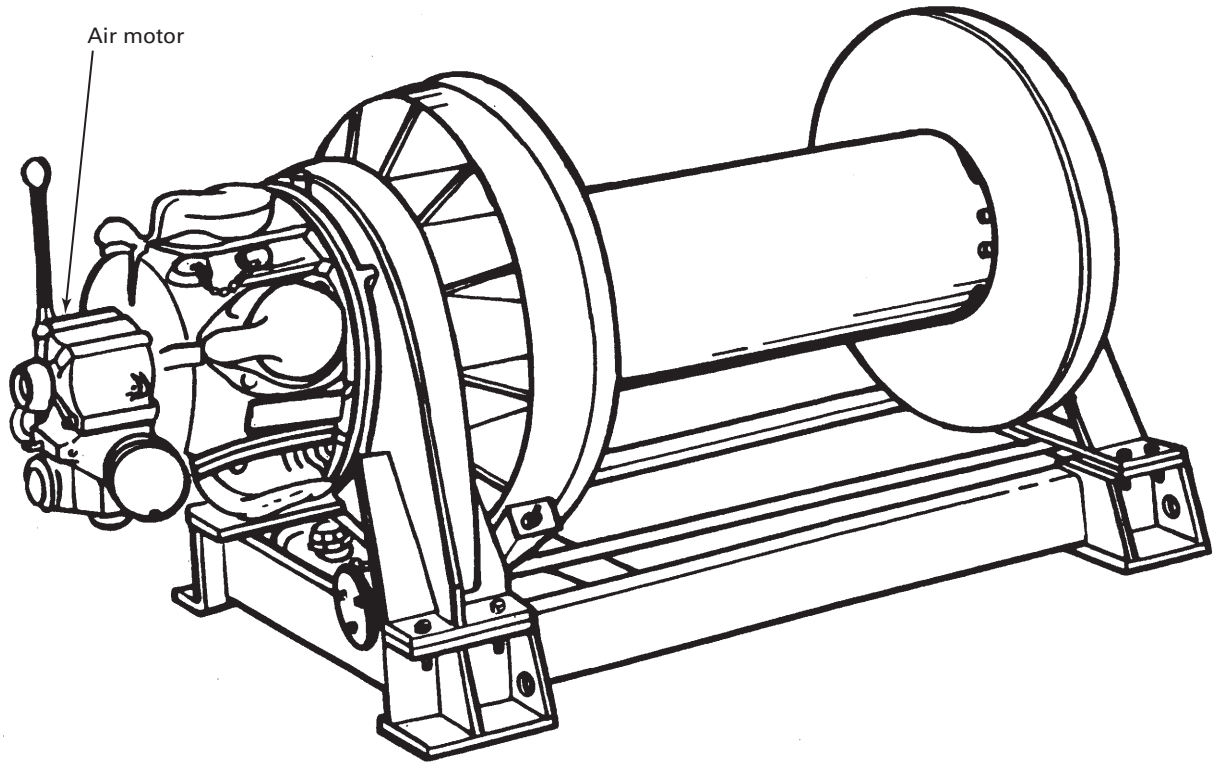


FIG. 1 SINGLE-DRUM BASE-MOUNTED HOIST

hoist, friction drum: a hoist with drum(s) controlled by friction clutches and brakes and provided with drum ratchets and pawls.

limiting device: a mechanical device that is operated by some part of a power driven machine or equipment to control motions of the machine or equipment.

load block: the assembly of hook or shackle, swivel, bearings, sheaves, pins, and frame suspended by the hoisting ropes.

load, working: the external load, in pounds (kilograms) or short tons (metric tons), applied to a hoist, including the weight of auxiliary load attaching equipment.

mast: the upright member of a derrick.

material elevator: a mechanism consisting of a tower with vertical members which guide a platform that is lifted and lowered by means of a hoist.

operating conditions, abnormal: environmental conditions that are unfavorable, harmful, or detrimental to or for the operation of a base-mounted drum hoist, such as excessively high or low ambient temperatures, exposure to adverse weather, corrosive fumes, dust laden or moisture laden atmospheres, and hazardous locations.

pawl: (also known as dog) a device for positively holding machinery against undesired rotation.

power controlled lowering: a system or device in the power train, other than the load hoist brake, which can control the lowering speed of the load hoist mechanism.

qualified person: a person who, by possession of a recognized degree in an applicable field or certificate of professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work. **(01)**

ratchet: a toothed member, attached to or part of the drum, for engagement with the pawl.

rated rope pull: (also known as rated line pull) the manufacturer's recommended load in pounds (kilograms) applied to the rope attached to the hoist drum.

reeving: a rope system in which the rope travels around drums and sheaves.

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repetitive pickup point: when operating on a short cycle operation, the rope being used on a single layer and being spooled repetitively over a short portion of the drum.

rope: refers to wire rope unless otherwise specified.

rope, rotation resistant: a wire rope consisting of an inner layer of strands laid in one direction covered by a layer of strands laid in the opposite direction; this has the effect of counteracting torque by reducing the tendency of the finished rope to rotate.

service, heavy: that service which involves operation within the rated load limit which exceeds normal service.

service, normal: that distributed service which involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65% of rated load for not more than 25% of the time.

service, severe: that service which involves normal or heavy service with abnormal operating conditions.

spooling, rope: winding of rope on a cylindrical drum in evenly spaced, uniform layers.

swing: rotating of a boom structure for movement of loads in a horizontal arc about the axis of rotation.

swingers, attached: a reversible drum unit arranged to rotate or swing a derrick mast and boom, or some other structure which supports a load lifting or lowering boom and which is attached to and receives its power from a hoist (see Fig. 2).

swingers, independent: a unit directly geared to its own power for rotating or swinging a derrick mast and boom (see Fig. 3).

swingers, rope: a unit provided with one or two reversible drums for winding the rope used for rotating or swinging a bull wheel of a boom supporting structure.

switch: a device for making, breaking, or changing the connections in an electric circuit.

switch, limit: a switch that is operated by some part of a power driven machine or equipment to alter the electric circuit associated with the machine or equipment.

switch, main: a switch controlling the entire power supply to the hoist.

tackle: an assembly of ropes and sheaves arranged for lifting, lowering, and pulling.

winch head: (also known as gypsy head) a rotatable cylindrical drum with curved end flanges, used for load handling by means of fiber rope coiled about its barrel with hand tension applied to the nonload end.

Section 7-0.3: References to Other Codes and Standards (01)

The following is a list of publications referenced in this Standard.

ANSI A10.4-1990, Safety Requirements for Workmen's Hoists

ANSI A10.5-1992, Safety Requirements for Material Hoists

ANSI Z26.1-1983, Safety Code for Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways

Publisher: American National Standards Institute (ANSI), 11 West 42nd Street, 13 fl, New York, NY 10036

ANSI/AWS D14.3-1982, Specification for Welding Earthmoving and Construction Equipment[1]

Publisher: American Welding Society (AWS), 550 N.W. LeJeune Road, Miami, FL 33135

ASME B30.6-1990, Derricks

Publisher: The American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P. O. Box 2350, Fairfield, NJ 07007

SAE J983 (Oct. 80), Recommended Practice: Crane and Cable Excavator Basic Operating Control Arrangements

Publisher: Society of Automotive Engineers, Inc. (SAE), 400 Commonwealth Drive, Warrendale, PA 15096

[1] May also be obtained from American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036. (01)

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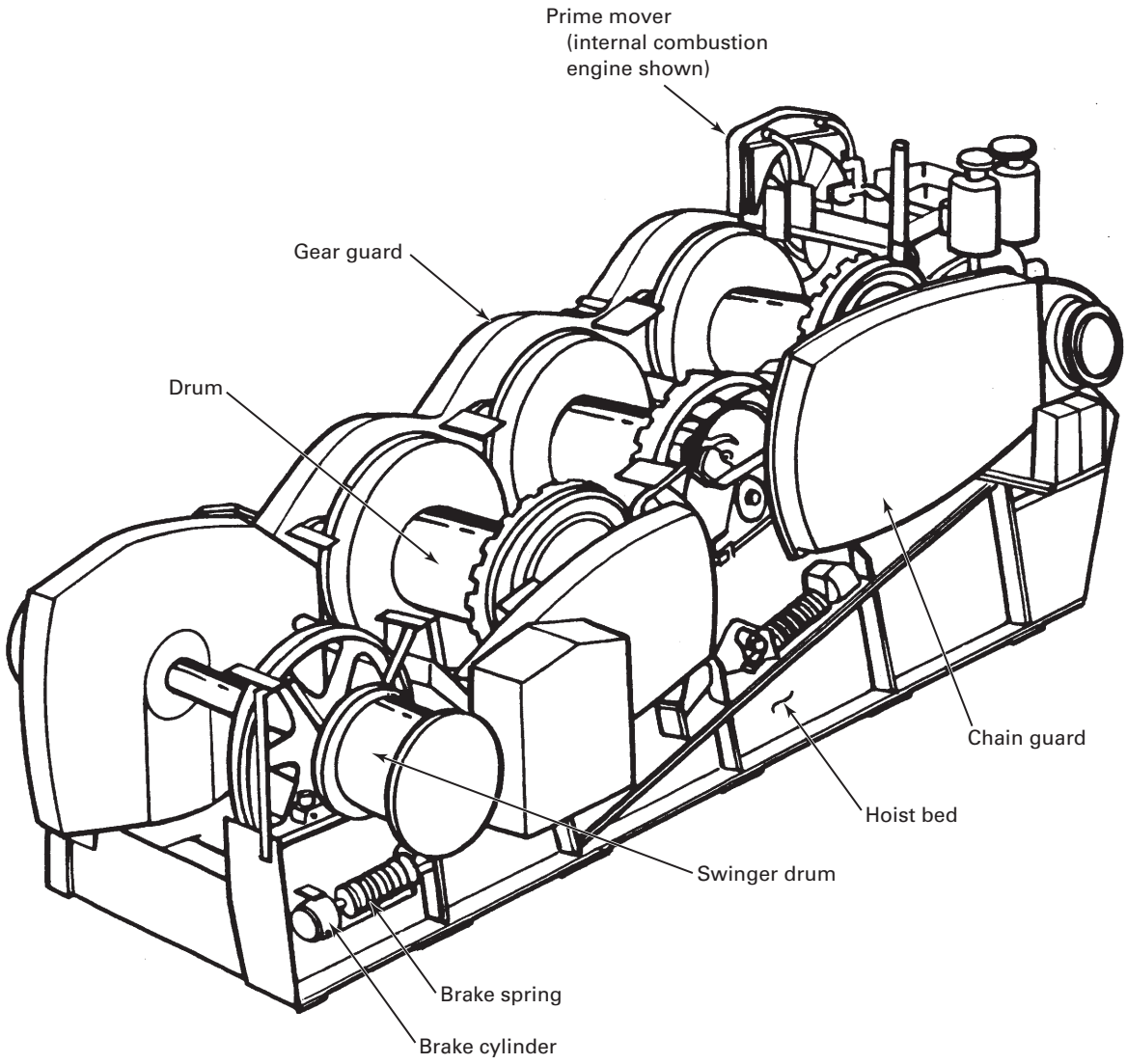


FIG. 2 THREE-DRUM BASE-MOUNTED HOIST WITH ATTACHED SWINGER

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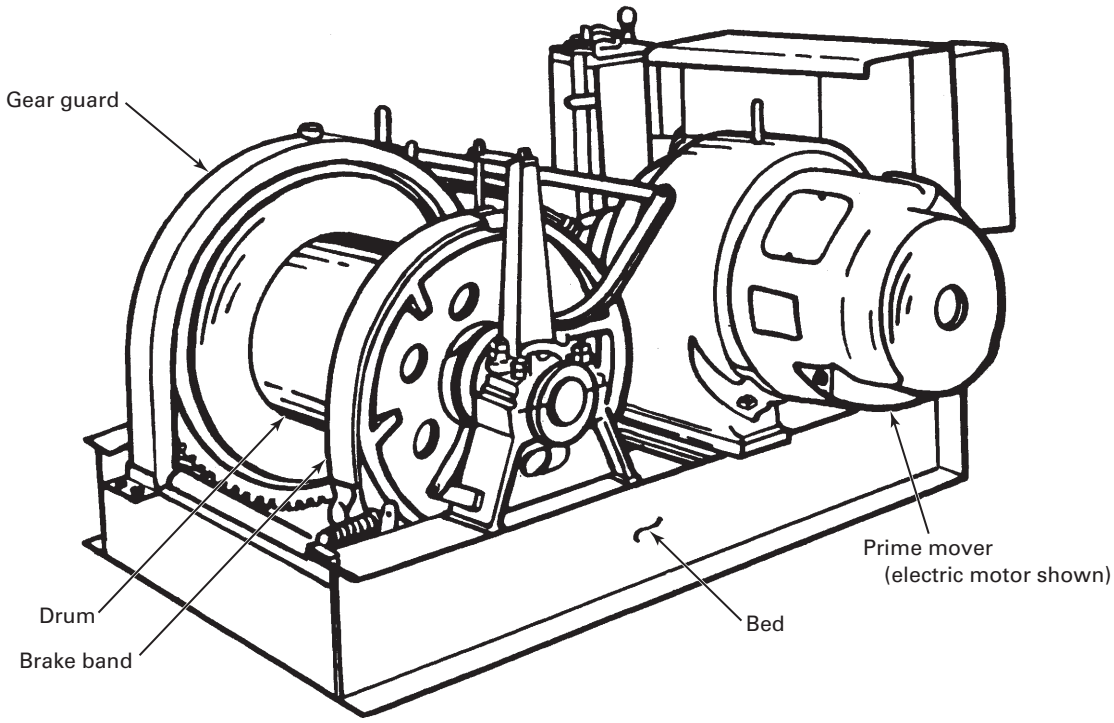


FIG. 3 INDEPENDENT DIRECT GEARED SWINGER OR SINGLE-DRUM HOIST

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CHAPTER 7-1
Construction and Installation

Section 7-1.1: Load Ratings and Markings

7-1.1.1 Basis. Hoist ratings are dependent upon such factors as applied power, amount of rope wound on the drum, drum size, and structural competence of the various hoist components and mounting methods.

7-1.1.2 Load Ratings. Load ratings shall be the manufacturer's recommended single rope pull in pounds (kilograms) at a specified rate of speed on a given size drum and prescribed number of layers of rope.

7-1.1.3 Markings. Hoists are to be marked with the following identifications for each drum:

(a) load rating;

(b) drum size consisting of barrel diameter, barrel length, and flange diameter;

(c) rope size(s);

(d) rope speed in feet per minute (meters per second);

(e) rated power supply.

Section 7-1.2: Construction

7-1.2.1 General. Hoists shall be designed and constructed to meet all stresses imposed on their frames and components under normal operating conditions when properly installed and with handling loads not exceeding the manufacturer's load ratings. Welding shall conform to recommended practices of ANSI/AWS D14.3.

7-1.2.2 Hoist and Swinger Mechanisms

(a) Drum assemblies shall be provided with power and operational characteristics to perform all lifting, lowering, and swinging functions when operated at rated load.

(b) Where maximum rated loads are being lowered for long distances, power controlled lowering usually is necessary to reduce the demand on the brake. Additional cooling provisions may be required on fluid transmissions or torque converters.

(c) The drum capacity shall accommodate the recommended rope size and length necessary to perform the specified function required for the load-handling equipment with which the hoist is used.

(1) No less than two full wraps of rope shall remain on the drum with the tackle system of the load-handling equipment extended to its maximum reach.

(2) Each drum end of the rope shall be anchored by a clamp attached to the drum, or by a socket arrangement approved by the hoist or rope manufacturer, providing for attachment of rope to the drum.

(3) Drum flanges shall extend a minimum of $^1/_2$ in. (13 mm) over the top layer of rope at all times.

(d) Diameter of the drum shall provide first layer rope pitch diameter of not less than the following:

(1) 18 times the nominal diameter of the rope used for service such as lifting or lowering a load (hoisting);

(2) 15 times the nominal diameter of the rope used for service such as raising or lowering a boom (booming);

(3) 15 times the nominal diameter of the rope used for service such as barge anchor handling;

(4) 15 times the nominal diameter of the rope used for swingers.

(e) Drums which hold items such as loads and booms suspended for a considerable time shall be provided with a ratchet and pawl or equivalent holding means, other than a brake, which shall be operable from the operator's station.

(f) All hoist and swing drives should be capable of starts and stops with variable acceleration and deceleration required in normal operation.

7-1.2.3 Brakes

(a) Each load hoist mechanism shall be equipped with at least one brake having a torque rating not less than that produced by 125% of the maximum rated line pull at the point where the brake is applied. The maximum rated line pull at each rope layer on the drum shall be considered in determining this rating.

(b) When power operated brakes having no continuous mechanical linkage between the actuating and braking means are used for controlling loads, an automatic

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means shall be provided to prevent the load from falling in the event of loss of brake actuating power.

(c) When a hoist is to be operated from a remote location, a self-setting brake shall be provided to prevent drum rotation in the event of power failure. This requirement does not apply to hoists where brakes are manually applied through mechanical linkages and the operator is at the control position.

(d) Foot operated brakes shall be constructed so that the operator's foot will not easily slip off the pedal.

(e) Swinger brakes shall have holding power in both directions to prevent movement of the rotating member of the load-handling equipment. The brake shall be capable of being set in the holding position and remaining so without attention on the part of the operator.

(f) A power control braking means (such as regenerative, dynamic, countertorque braking, or power controlled lowering) or a mechanically controlled braking means shall be provided and shall be capable of maintaining controlled lowering speeds.

7-1.2.4 Adjustments. Brakes and clutches shall be provided with adjustments where necessary to compensate for wear and to maintain tension in springs where used.

7-1.2.5 Guards

(a) Exposed moving parts, such as gears, set screws, projecting keys, chains, chain sprockets, and reciprocating or rotating parts, which might constitute a hazard under normal operating conditions, shall be guarded.

(b) Guards shall be fastened.

(c) Guards shall be capable of supporting, without permanent distortion, the weight of a 200 lb (90 kg) person unless the guard is located where it is unlikely that a person will step on it.

7-1.2.6 Ropes

(a) Ropes shall be of a size, grade, and construction to withstand the loads imposed. Fiber ropes may be used only with the manufacturer's or qualified person's recommendations.

(b) Ropes shall be of a length for the entire range of movement specified for the application, with no less than two full wraps of rope on the drum at all times.

(c) The design factor for ropes, except rotation resistant ropes, shall be not less than 3.5. The design factor for rotation resistant ropes shall be not less than 5. [The design factor of 5 or greater for rotation resistant ropes may be modified by the hoist user by complying with the provisions of para. 7-3.2.1(b).]

NOTE: ASME B30.6 requires a minimum design factor of 3.5:1 for running ropes used with derricks. ANSI A10.5 requires a minimum design factor for ropes of 7:1.

(d) Wherever exposed to temperatures in excess of 180°F (82°C), rope having an independent wire rope or wire strand core, or other temperature damage-resistant core shall be used.

(e) The rope (right or left lay) should be selected in accordance with the drum rotation and anchorage.

7-1.2.7 Controls

(a) All controls used during the normal operating cycle shall be located within reach of the operator while at the operator's station. Arrangement of controls should be in accordance with applicable requirements of SAE J983.

(b) Electric motor operated hoists shall be provided with a device which will disconnect all motors from the line on failure of power, and will not permit any motor to be restarted until the controller handle is brought to the *off* position, or a reset switch or button is operated.

(c) Electric motor operated hoists which are capable of overspeeding the power plant on overhauling regenerative loads shall be provided with means to prevent such overspeeding.

(d) Remote operated base-mounted drum hoists shall function so that if the control signal for any hoist motion becomes ineffective, that hoist motion shall stop.

7-1.2.8 Prime Mover Controls. Controls for operating the prime mover shall be within reach of the operator and shall include means to:

(a) start and stop;

(b) control speed of internal combustion engines or drive motors;

(c) stop two-cycle internal combustion engines or drive motors under emergency conditions;

(d) shift selective transmissions when used.

7-1.2.9 Control Forces and Movements. When a hoist is operated within the manufacturer's ratings, the following shall apply under normal operation.

(a) Forces not greater than 35 lb (156 N) on hand levers and forces not greater than 50 lb (222 N) or less than 8 lb (36 N) on foot pedals.

(b) Travel distance on hand levers not greater than 14 in. (356 mm) from neutral position on two-way levers, and not greater than 24 in. (610 mm) on one-way levers; travel distance on foot pedals not greater than 10 in. (254 mm).

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7-1.2.10 Engine Clutch. All hoists except direct geared hoists shall be provided with a clutch for disengaging power to the machinery. The clutch control shall be within reach from the operator's station.

7-1.2.11 Electric Resistors

(a) Resistor units shall be supported to minimize vibration effect.

(b) Provision shall be made to prevent broken parts or molten metal from falling from the hoist.

(c) If ventilated or nonventilated resistor enclosures are provided, the enclosures shall be installed to prevent the accumulation of combustible matter.

7-1.2.12 Switches. On electric driven hoists, a motor circuit switch or circuit breaker of the enclosed type with provisions for locking in open position shall be provided in the main power supply.

7-1.2.13 Operator's Cab (When Provided)

(a) If a cab is provided and windows are glazed, the windows shall be of safety glazing material as defined in ANSI Z26.1. Windows shall be located to provide the operator with visibility in all required directions. Refer to ANSI Z26.1.

(b) A clear passageway shall be provided from the operator's station to an exit door.

(c) Handholds or steps shall be provided to facilitate entrance to and exit from the cab, when necessary.

(d) Cab lighting, either natural or artificial, shall provide a level of illumination that enables the operator to observe the operating controls.

(e) Where internal combustion engines are the prime mover for the hoists, the exhaust shall be piped in such a manner that exhaust gases cannot enter open windows of the cab, or be pulled into the cab ventilating system, where such exists.

(f) The cab construction, when applicable, shall offer protection from falling objects. The protection shall be at least equivalent to that provided by standard 2 in. (51 mm) lumber.

(g) The noise level at the operator's station should be a consideration in the manufacture of all new base-mounted drum hoists.

7-1.2.14 Lubrication. Lubricating points should be accessible without the necessity of removing guards or other parts.

7-1.2.15 Fire Extinguishers. A portable fire extinguisher with a basic minimum extinguisher rating of 10 BC shall be installed in the cab or operator's station.

Section 7-1.3: Installation

7-1.3.1 Attachments and Anchorages. Attachments and anchorages for hoist bases shall provide mounting of the hoist and shall be capable of withstanding loads imposed by the hoist under operating conditions. The weight of the hoist and loads imposed by the load ropes shall be provided for.

7-1.3.2 Location of Drum Hoists. Drum hoists shall be located in a manner that provides proper rope spooling on the drums.

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CHAPTER 7-2
Inspection, Testing, and Maintenance

Section 7-2.1: Inspection

(a) Initial Inspection. Prior to initial use, all new, reinstalled, altered or modified, hoists shall be inspected by a designated person to verify compliance with the applicable provisions of this Volume.

(b) Inspection procedure for hoists in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the hoists and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are designated as *frequent* and *periodic* with respective intervals between inspections as defined below.

(1) Frequent Inspection. Visual examinations by the operator or other designated personnel with records not required.

(a) Normal service: monthly;

(b) Heavy service: weekly to monthly;

(c) Severe service: daily to weekly;

(d) Special or infrequent service: recommended by a qualified individual before and after each occurrence.

(2) Periodic Inspection. Visual inspection by an appointed person making records of apparent external conditions to provide the basis for a continuing evaluation.

(a) Normal service: equipment in place: yearly;

(b) Heavy service: equipment in place: yearly;

(c) Severe service: equipment in place: quarterly;

(d) Special or infrequent service authorized by a qualified person before the first such occurrence and as directed by the qualified person for any subsequent occurrences.

7-2.1.1 Frequent Inspection. Items such as the following shall be inspected for wear or damage at intervals as defined in para. 7-2.1(b)(1), or as specifically indicated below, including observations during operation for wear or damage which might appear between regular inspections. Any deficiencies, such as listed below, shall be carefully examined, and a determination made by a qualified person as to whether they constitute a hazard:

(a) all control mechanisms for maladjustment or excessive wear interfering with proper operation;

(b) all limit switches or limiting devices for malfunction at the beginning of each work shift;

(c) deterioration or leakage in air or hydraulic systems;

(d) load carrying ropes (visual inspection daily for excessive wear and distortion);

(e) electrical apparatus for malfunctioning, signs of excessive deterioration, and dirt and moisture accumulation.

7-2.1.2 Periodic Inspection. Complete inspections of the hoist shall be performed at intervals as defined in para. 7-2.1(b)(2). Any deficiencies, such as listed below, shall be examined and determination made as to whether they constitute a hazard. These inspections shall include the requirements of para. 7-2.1.1 and, in addition, items such as the following:

(a) deformed, cracked, or corroded members;

(b) loose bolts or rivets;

(c) cracked or worn drums or sheaves;

(d) worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers, and locking and clamping devices;

(e) excessive wear distortion or damage on brake and clutch system parts and linings, and on pawls and ratchets;

(f) gasoline, diesel, electric, or other power plants for improper performance and noncompliance with applicable safety requirements;

(g) excessive wear of chain drive sprockets and excessive chain stretch;

(h) electrical apparatus for contact pitting or any deterioration of controller contactors, limit switches, and push button stations;

(i) foundations or supports for continued ability to sustain the imposed loads.

7-2.1.3 Hoists Not in Regular Use

(a) A hoist which has been idle for a period of one month or more, but less than six months, shall be

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given an inspection conforming with the requirements of para. 7-2.1.1 before being placed in service.

(b) A hoist which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of paras. 7-2.1.1, 7-2.1.2, and 7-2.4.1(b).

(c) Standby hoists shall be inspected at least semi-annually in accordance with the requirements of paras. 7-2.1.1 and 7-2.4.1(b).

(d) Standby hoists exposed to abnormal operating conditions should be inspected more frequently than required in para. 7-2.1.3(c).

7-2.1.4 Inspection Records. Dated inspection reports and records shall be made on critical items such as brakes and ropes. Dated records should be kept where readily available to appointed personnel.

Section 7-2.2: Testing

7-2.2.1 Operational Tests

(a) Prior to initial use, new, altered, modified, reinstalled, or repaired hoists shall be tested to verify compliance with this volume, including the following functions:

(1) lifting and lowering on each drum;

(2) swing;

(3) operation of clutches, brakes, and pawls;

(4) operation of limit switches, and locking and safety devices when provided.

(b) The trip-setting of limit switches and limiting devices shall be determined by tests under no-load conditions. Tests shall be conducted first under slow speed and then with increasing speeds up to maximum speed. Actuating mechanisms shall be located so that they will trip the switches or limiting devices in time to stop motion without damage to any part of the hoisting arrangement.

(c) All tie-downs shall be acceptable to a designated person.

(01) 7-2.2.2 Load Test

(a) New Hoists. All new hoists shall be tested by the manufacturer. The load test shall not be less than 110% of the rated load nor more than 125% of the rated load. A written report of the test should be prepared and placed on file.

(b) Altered, modified, reinstalled and repaired hoists:

(1) Prior to initial use, altered, modified, reinstalled or repaired hoists shall be functionally tested. A written report of the test should be prepared and placed on file. A qualified person shall determine the need for a load test.

(2) The load test, if made, shall consists of the following as minimum requirements:

(a) The test load shall not be less than 110% of the rated load nor more than 125% of the rated load, unless otherwise recommended by the manufacturer.

(b) The test load shall be hoisted a vertical distance to assure that the load is supported by the hoist and held by the hoist brake(s).

(c) The test load shall be lowered, stopped and held with the brake(s).

Section 7-2.3: Maintenance

7-2.3.1 Preventive Maintenance

(a) A preventive maintenance program should be established based on the hoist manufacturer's or a qualified person's recommendations. Dated records should be available to appointed personnel.

(b) Replacement parts shall be at least equal to the original parts.

7-2.3.2 Maintenance Procedure

(a) Before adjustments and repairs are started on a hoist, the following precautions shall be taken, as applicable:

(1) if electrically powered, the main or emergency switch locked in the *open* position;

(2) the power plant stopped or disconnected at the takeoff;

(3) power plant starting means rendered inoperative;

(4) drum pawls engaged, or other means provided to prevent load ropes from inadvertently rotating the mechanism;

(5) warning or *Out of Order* signs placed on the hoist.

(b) After adjustments and repairs have been made, the hoist shall not be returned to service until all guards have been reinstalled, limiting devices reactivated, and maintenance equipment removed.

(c) Warning or *Out of Order* signs shall be placed or removed by appointed personnel.

7-2.3.3 Adjustments and Repairs

(a) Any hazardous condition disclosed by the inspection and requirements of Section 7-2.1 shall be corrected before operation of the hoist is resumed. Adjustments and repairs shall be done only by a designated person.

(b) Adjustments shall be maintained to ensure correct

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functioning of components. The following are examples:

(1) all functional operating mechanisms;

(2) brakes, clutches, and pawls;

(3) power plants;

(4) limit switches and other limiting devices;

(5) control systems;

(6) foundations and other anchorages.

(c) Repairs or replacements shall be made as needed. The following are examples:

(1) all critical parts which are cracked, broken, bent, or excessively worn;

(2) pitted or burned electrical contacts should be corrected only by replacement and in sets; controller parts should be lubricated only as recommended by the manufacturer or by a qualified person.

7-2.3.4 Lubrication

(a) All moving parts of the hoist for which lubrication is specified should be regularly lubricated. Lubricating systems should be checked for proper delivery of lubricant. Care should be taken to follow manufacturer's recommendations as to points and frequency of lubrication, levels, and type of lubricant to be used.

(b) All rotating machinery should be stopped, where feasible, while lubricants are being applied and protection provided as called for in paras. 7-2.3.2(a)(1)–(4), unless equipped for automatic or remote lubrication.

Section 7-2.4: Rope Inspection, Replacement, and Maintenance

7-2.4.1 Inspection

(a) Frequent Inspection

(1) Running ropes in continuous service should be visually inspected once each working day. A visual inspection shall consist of observation of all rope which can be expected to be in use during the day's operations. These visual observations should be concerned with discovering damage, such as listed below, which may be a cause for removing the rope from service or for performing a more detailed examination [refer to para. 7-2.4.1(b)]:

(a) distortion of the rope such as kinking, crushing, unstranding, birdcaging, main strand displacement, or core protrusion;

(b) general corrosion;

(c) broken or cut strands;

(d) number, distribution, and type of visible broken wires [see para. 7-2.4.1(c) for further guidance].

(2) Care shall be taken when inspecting sections of rapid deterioration such as flange points, crossover points, and repetitive pickup points on drums.

(b) Periodic Inspection

(1) The inspection frequency shall be determined by a qualified person and shall be based on such factors as: expected rope life as determined by experience on the particular installation or similar installations, severity of environment, percentage of capacity lifts, frequency rates of operation, and exposure to shock loads. Inspections need not be at equal calendar intervals and should be more frequent as the rope approaches the end of its useful life. This inspection shall be made at least annually.

(2) Periodic inspections shall be performed by a designated person. This inspection shall cover the entire length of rope. The individual outer wires in the strands of the rope shall be visible to this person during the inspection. Any deterioration resulting in appreciable loss of original strength, such as described below, shall be noted and determination made as to whether further use of the rope would constitute a hazard:

(a) points listed in para. 7-2.4.1(a);

(b) reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires;

(c) severely corroded or broken wires at end connections;

(d) severely corroded, cracked, bent, worn, or improperly applied end connections.

(3) Care shall be taken when inspecting sections of rapid deterioration, such as the following:

(a) sections in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited;

(b) sections of the rope at or near terminal ends where corroded or broken wires may protrude.

(c) Rope Replacement

(1) No precise rules can be given for determination of the exact time for rope replacement, since many variable factors are involved. Once a rope reaches any one of the specified removal criteria, it may be allowed to operate to the end of the work shift, based on the judgment of a qualified person. The rope shall be replaced after that work shift, at the end of the day, or at the latest time prior to the equipment being used by the next work shift.

(2) Removal criteria for rope replacement shall be as follows:

(a) in running ropes, six randomly distributed broken wires in one rope lay, or three broken wires in one strand in one rope lay;

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(b) one outer wire broken at the contact point with the core of the rope which has worked its way out of the rope structure and protrudes or loops out from the rope structure;

(c) wear of one-third the original diameter of outside individual wires;

(d) kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure;

(e) evidence of heat damage from any cause;

(f) reductions from nominal diameter greater than those shown below:

Rope Diameter	Max. Allowable Reduction From Nominal Dia.
Up to 5/16 in. (8 mm)	1/64 in. (0.4 mm)
3/8 in. (9.5 mm) to 1/2 in. (13 mm)	1/32 in. (0.8 mm)
9/16 in. (14.5 mm) to 3/4 in. (19 mm)	3/64 in. (1.2 mm)
7/8 in. (22 mm) to 1 1/8 in. (29 mm)	1/16 in. (1.6 mm)
1 1/4 in. (32 mm) to 1 1/2 in. (38 mm)	3/32 in. (2.4 mm)

(g) in standing ropes, more than two broken wires in one rope lay in sections beyond end connections, or more than one broken wire at an end connection.

(3) Broken wire removal criteria cited in this volume apply to wire rope operating on steel sheaves and drums. The user shall contact the sheave, drum, or hoist manufacturer, or a qualified person, for broken wire removal criteria for wire ropes operating on sheaves and drums made of material other than steel.

(4) Replacement rope shall have strength rating at least as great as the original rope furnished by the hoist manufacturer. Any deviation from the original size, grade, or construction shall be specified by a rope manufacturer, the hoist manufacturer, or a qualified person.

(d) Ropes on hoists not in regular use. Ropes which have been idle for a period of a month or more due to shutdown or storage of a hoist on which they are installed shall be given an inspection in accordance with para. 7-2.4.1(a) before they are placed in service. This inspection shall be for all types of deterioration and shall be performed by a designated person whose approval shall be required for further use of the rope.

(e) Inspection Records

(1) Frequent Inspection. No records required.

(2) Periodic Inspection. In order to establish data as a basis for judging the proper time for replacement, a dated report of rope condition at each periodic inspection shall be available to appointed personnel. This report shall cover points of deterioration listed in para. 7-2.4.1(b)(2).

(f) A long range inspection program should be established and include records on examination of ropes removed from service so that a relationship can be established between visual observation and actual condition of the internal structure.

7-2.4.2 Rope Maintenance

(a) Rope shall be stored to prevent damage or deterioration.

(b) Unreeling or uncoiling of rope shall be done as recommended by the roJpe manufacturer and with care to avoid kinking or inducing a twist.

(c) Before cutting rope, seizings shall be placed on each side of the place where the rope is to be cut to prevent unlaying of the strands.

(d) During installation, care shall be exercised to avoid dragging of the rope in dirt or around objects which will scrape, nick, crush, or induce sharp bends in it.

(e) Rope should be maintained in a well-lubricated condition. It is important that lubricant applied as part of a maintenance program shall be compatible with the original lubricant, and to this end, the rope manufacturer should be consulted; lubricant applied shall be the type which does not hinder visual inspection. Those sections of rope which are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating rope. The object of rope lubrication is to reduce internal friction and to prevent corrosion. Periodic field lubrication is particularly important for rotation resistant rope.

(f) When an operating rope shows greater wear at well-defined localized areas than on the remainder of the rope, rope life can be extended, in cases where a reduced rope length is adequate, by cutting off a section at one end and thus shifting the wear to different areas on the rope.

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CHAPTER 7-3
Operation

Section 7-3.1: Qualifications for and Conduct of Operators and Operating Practices

7-3.1.1 Operators

(a) Hoists shall be operated only by the following personnel:

(1) designated persons;

(2) trainees under the direct supervision of a designated person;

(3) maintenance and test personnel when it is necessary in the performance of their duties.

(b) No one, other than personnel specified in para. 7-3.1.1(a), shall enter a hoist operator's cab or operating position with the exception of persons such as oilers or supervisors whose duty requires them to do so, and then only in the performance of their duties and with the knowledge of the operator or other appointed person.

7-3.1.2 Qualifications for Operators

(a) Operators shall be required by the employer to pass a written or oral examination and a practical operating examination unless able to furnish satisfactory evidence of qualifications and experience. Qualifications shall be limited to the specific type of equipment for which examined.

(b) Operators and the operator trainees shall meet the following physical qualifications:

(1) have vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses;

(2) be able to distinguish colors, regardless of position, if color differentiation is required for operation;

(3) hearing, with or without hearing aid, must be adequate for the specific operation;

(4) have sufficient strength, endurance, agility, coordination, and speed of reaction to meet the demands of equipment operation.

(c) Evidence of physical limitations or emotional instability which could render the operator a hazard to himself or others, or which in the opinion of the examiner could interfere with the operator's safe performance, may be cause for disqualification. In such cases, specialized clinical or medical judgments and tests may be required.

(d) Evidence that an operator is subject to seizures or loss of physical control shall be reason for disqualification. Specialized medical tests may be required to determine these conditions.

(e) Operators and operator trainees should have good depth perception, field of vision, reaction time, manual dexterity, coordination, and should not be prone to dizziness or similar undesirable characteristics.

7-3.1.3 Conduct of Operators

(a) The operator shall not engage in any practice which might divert attention while actually engaged in operating the hoist.

(b) When physically or mentally unfit, an operator shall not engage in the operation of the hoist.

(c) The operator shall respond to signals only from the person who is directing the lift, or an appointed signalperson. However, the operator shall obey a stop signal at all times, no matter who gives it.

(d) Each operator shall be held responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator shall consult with the supervisor before handling the load(s).

(e) Before leaving the hoist unattended, the operator shall:

(1) land any attached load, except as outlined in para. 7-3.2.3;

(2) disengage clutches;

(3) put the handles of controls in the *off* position;

(4) open main switch or stop the engine;

(5) engage manual locking devices in the absence of automatic holding equipment.

(f) If there is a warning sign on the switch or engine starting controls, the hoist operator shall not close the switch or start operations until the sign has been removed by an appointed person.

(g) Before closing the switch or starting the hoist engine, the hoist operator shall ensure that all controls are in the *off* position and all personnel are in the clear.

(h) If power fails during operations, the hoist operator shall:

(1) set all brakes or locking devices;

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(2) move all clutch or other power controls to the *off* or *neutral* position;

(3) if practical, the suspended load should be landed under brake control.

(i) The operator shall be familiar with the equipment and its proper care. If adjustments or repairs are necessary, the operator shall report the same promptly to the appointed person and shall also notify the next operator.

(j) All controls shall be tested by the operator at the start of a new shift. If any controls do not operate properly, they shall be adjusted or repaired before operations are begun.

Section 7-3.2: Handling the Load

7-3.2.1 Size of Load

(a) No hoist shall be loaded beyond the rated line pull, except for testing.

(b) When rotation resistant ropes are used with an operating design factor less than 5, but in no case less than 3.5, the special provisions that follow shall apply.

(1) For each such lifting assignment:

(a) a designated person shall direct each lift;

(b) a designated person shall ascertain that the rope is in satisfactory condition [paras. 7-2.4.1(a)(1)(a)–(d)] both before and after lifting; but more than one broken wire in any one lay shall be reason to consider not using the rope for such lifts;

(c) operations shall be conducted in such manner and at such speeds as to minimize dynamic effects.

(2) Each lift under these provisions shall be recorded in the hoist inspection record and such prior uses shall be considered before permitting another such lift.

(3) Provisions of para. 7-3.2.1(b) are not intended to permit duty cycle or repetitive lifts to be made with operating design factors less than 5.

7-3.2.2 Moving the Load

(a) Care shall be taken in lifting to be certain that:

(1) hoist ropes are not kinked;

(2) there is no sudden acceleration or deceleration of the moving load.

(b) Before starting to lift, if there is a slack rope condition, the operator shall determine that the rope is properly seated on the drum.

(c) The operator should be notified each time a load approaching the maximum rated load is to be handled so that the brakes can be tested by lifting the load a few inches and applying the brakes.

(d) No load hoist drum shall be rotated in the lowering direction beyond the point where less than two wraps of rope remain on the drum.

(e) When swinging a load by means of a derrick or similar structure, sudden starts and stops should be avoided.

(f) When loads are lowered for long distances, the user should check the thermal capacity of the brakes and motors, as outlined by ratings or charts provided by the manufacturer for both repetitive and intermittent operation. Where maximum rated loads are being lowered for long distances, power controlled lowering usually is necessary to reduce the demand on the brake. Additional cooling provisions may be required on fluid transmissions or torque converters.

(g) Drum flange shall extend a minimum of $^1/_2$ in. (13 mm) over the top layer of rope at all times.

7-3.2.3 Holding the Suspended Load

(a) The operator shall not leave the controls while the load is suspended unless the precautions in the exceptions listed in (b), (c), or (d) below have been taken.

(b) If the load must remain suspended for any considerable time, a pawl or other equivalent means, rather than the brake alone, shall be used to hold the load.

(c) As an exception to para. 7-3.2.3(a), the operator may leave the controls, provided that prior to leaving, an appointed individual and the operator shall establish the requirements for dogging the hoist [see para. 7-3.2.3(b)] and furnish notices, set up barricades, or whatever other precautions may be necessary.

(d) Hoists, when holding anchor lines or applying static pressure, are not considered as holding suspended loads; however, prior to the operator leaving the controls, the operator and an appointed individual shall establish the requirements for braking, dogging the hoist [see para. 7-3.2.3(b)], furnishing notices, setting up barricades, or whatever other precautions may be necessary.

7-3.2.4 Use of Winch Heads

(a) The winch head shall not be used without the knowledge of the operator.

(b) The operator shall be within convenient reach of the engine disconnect clutch control lever, or the power control lever while a winch head is being used.

Section 7-3.3: Signals

7-3.3.1 Standard Signals. Standard signals to the operator shall be in accordance with the standards prescribed in paras. 7-3.3.2 and 7-3.3.3, unless voice

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communication equipment (telephone, radio, or equivalent) is utilized. Signals shall be discernible or audible at all times. No response shall be made unless signals are clearly understood.

7-3.3.2 Hand Signals. Hand signals shall be in accordance with Fig. 4 and shall be posted conspicuously.

7-3.3.3 Bell Signals. Bells of different tones shall be used for boom and load. The signals shall be as follows:

(a) When Operating. One bell or light means "Stop."

(b) When Stopped. One bell or light means "Raise;" two bells or lights mean "Lower."

(c) When Temporarily Stopped. Two bells or lights alternately on boom and load mean "Dog It Off" or "Stopping For Some Time."

(d) When Dogged Off. Before starting, ring four bells or light four lights alternately on boom and load, meaning "Get Ready To Start Work Again."

7-3.3.4 Special Signals. Some special operation may require additions to, or modifications of, the standardized signals. These special signals should be agreed upon and thoroughly understood by both the signalperson and the operator, and should not be in conflict with the standard signals.

7-3.3.5 Instructions. If it is desired to give instructions to the operator other than those provided for in the standard signal system, hoist operation shall be stopped.

Section 7-3.4: Miscellaneous

7-3.4.1 Fire Extinguishers. Operating and maintenance personnel shall be familiar with the use and care of the fire extinguishers provided.

7-3.4.2 Refueling

(a) When refueling with a portable container, it shall be a safety-type can equipped with automatic closing cap and flame arrester.

(b) Gasoline powered hoists shall not be refueled with the engine running.

(c) Fuel containers shall not be stored in hoist enclosures.

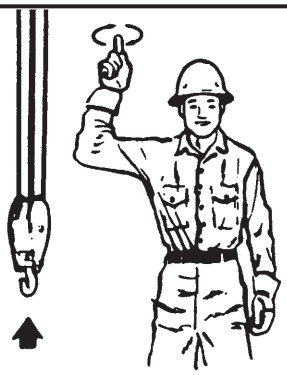
(d) Smoking or open flames shall be prohibited in the refueling area.

7-3.4.3 Cab or Operating Enclosure

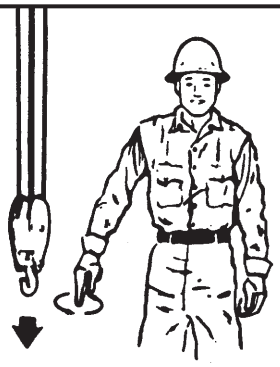
(a) Necessary clothing and personal belongings shall be stored in such a manner as to not interfere with access or operation.

(b) Tools, oilcans, waste, extra fuses, and other necessary articles shall be stored in the toolbox and shall not be permitted to lie loose in or about the cab or operating enclosure.

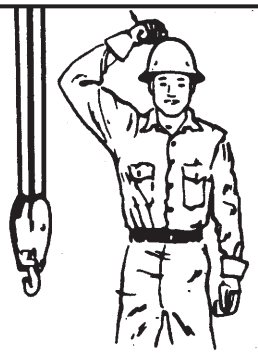
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HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.



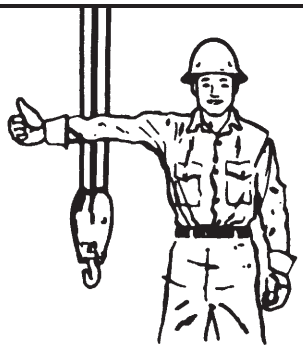
LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circle.



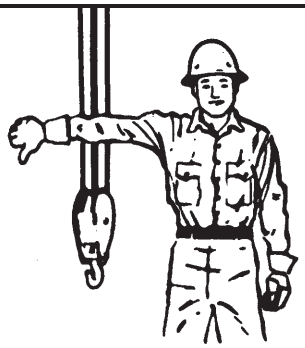
USE MAIN HOIST. Tap fist on head; then use regular signals.



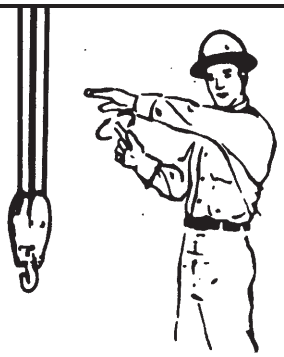
USE WHIPLINE (Auxiliary Hoist). Tap elbow with one hand; then use regular signals.



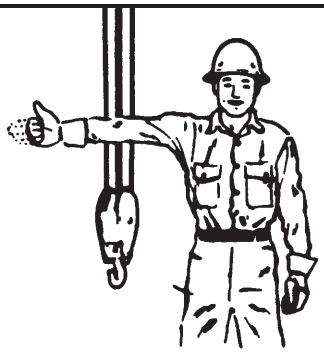
RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.



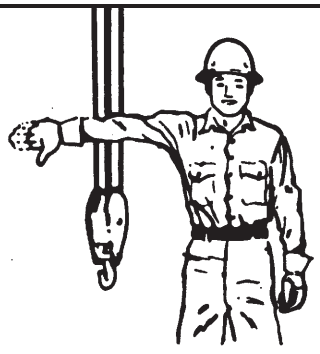
LOWER BOOM. Arm extended fingers closed, thumb pointing downward.



MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)



RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.



LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.

FIG. 4A STANDARD HAND SIGNALS FOR HOIST OPERATION

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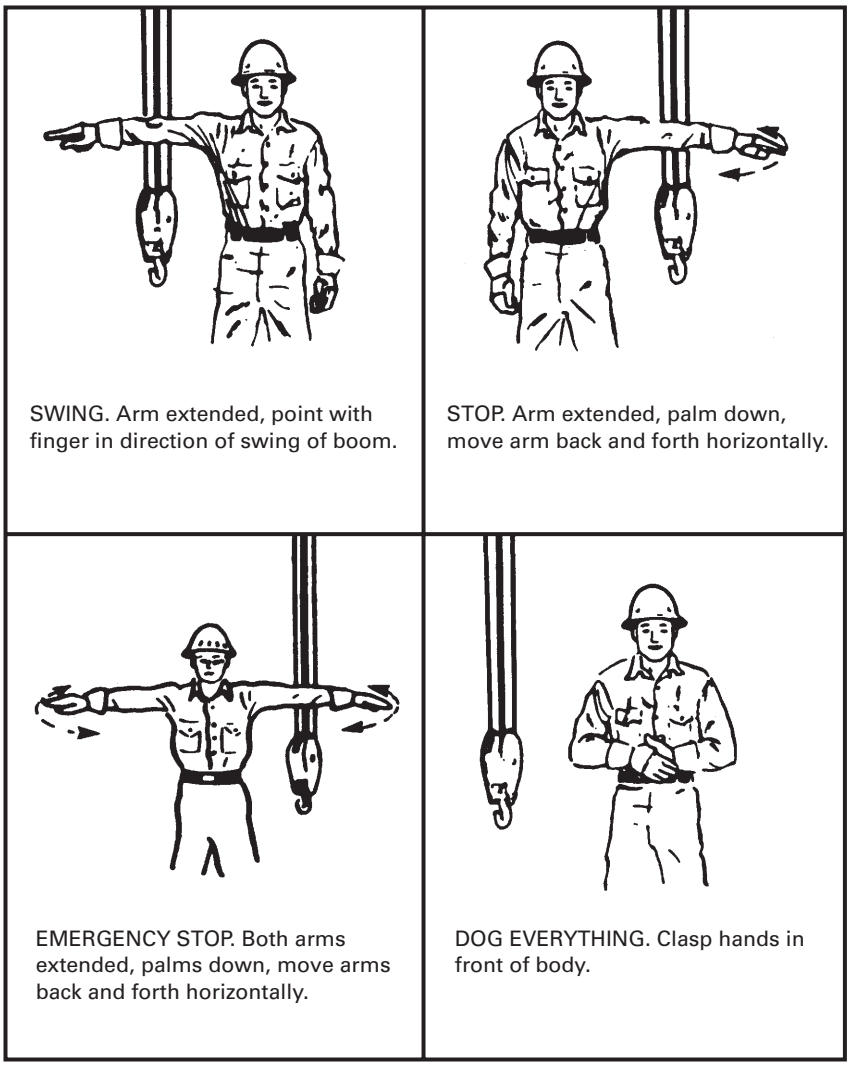


FIG. 4B STANDARD HAND SIGNALS FOR HOIST OPERATION (CONT'D)

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